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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/676,982	10/01/2003	Christian L. Belady	10018060-3	7690

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EXAMINER

DUONG, THO V

ART UNIT PAPER NUMBER

3743

DATE MAILED: 01/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

SP

<b>Office Action Summary</b>	<b>Application No.</b> 10/676,982	<b>Applicant(s)</b> BELADY ET AL.	
	<b>Examiner</b> Tho v Duong	<b>Art Unit</b> 3743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 3,4,6-9,15,17,19,20 and 25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,5,10-14,16,18 and 21-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>7/20/2004</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION*****Election/Restrictions***

Claim 4 is withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 11/12/2004.

Applicant indicates that claims 1-3 and 5-24 are readable on the elected species figure 6 and thermal conductive sponge spring element. The examiner disagrees because the elected thermal interfaced system (80), which is shown in figure 6, used with the elected conductive sponge like material (60) at least preclude other features such as a plurality of spring elements shown in figures 10 and 11. Claim 15 is directed to the non-elected species of figure 3. Therefore, claims 3, 6,7,8,9,15,17,19,20 and 25 have been further withdrawn from further consideration since these claims do not read on the elected species. Figure 6 discloses that the spring element is disposed within the dimension (92), which is substantially in flush with face of the pins.

Applicant's election with traverse of species D and the thermally conductive sponge in the reply filed on 11/12/2004 is acknowledged. This is not found persuasive because applicant does not present any ground of traversal.

The requirement is still deemed proper and is therefore made FINAL.

***Drawings***

The drawings are objected to because figure 4 does not show the crosshatch of the spring element (60) in order to distinguish between the spring element and the gap. Regarding, figure 9, applicant disclose in the specification that reference element (82) indicates pins. However, reference (82) does not appear in figure 9 to indicate pins. Corrected drawing sheets in

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compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2,13,14,16,18 and 23-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Chu (US 4,226,281). Chu discloses (figures 1, 6 and column 4, line 65- column 5, line 2) a thermal interface (10) comprising a thermal spreader (18) forming a plurality of

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passageways (22); a spring element such as layer with a substantially planar face of sponge like material (36) coupled with the spreader (18); and a plurality of thermally conductive pins (24) for the passageways and perpendicular with the planar face of the spring element (36); each of the pins (24) having a head (25) and a shaft moving with the spring element (36); at least part of the shaft being internal to the passageway and forming a gap between the pin (24) and the gap (22), which is filled with a thermal grease or helium gas; the pin heads (25) collectively and macroscopically conform to an object (12,14) couple thereto; the head (25) being substantially flush with the face of the spring element (36); the object comprising a semiconductor die (12). Regarding claim 16,23 and 24, Chu discloses all of the structural limitations of the invention. Therefore, it is believed that Chu's thermal interface is capable of performing the method for transferring thermal energy from a body to a heat sink as claimed.

Claims 1,12,14,16 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Chao- Fan Chu et al. (US 5,097,385). Chu discloses (figure 2) a thermal transfer interface comprises a thermal spreader (228) forming with a plurality of passageways; a spring element coupled with the spreader; a plurality of thermally conductive pins (210,212) for the passageways, each of the pins having a head and a shaft moving with the spring element, at least part of the shaft being internal to the passageway and forming a gap with an internal surface of the passageway, wherein the pin heads collectively and macroscopically conform to a semiconductor die (204); and the pin heads arranged in a geometric pattern that covers an area (205) extending beyond a region of contact between the pin heads and the die.

***Claim Rejections - 35 USC § 103***

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chu (U 4,226,281) in view of Lamb et al. (US 5,920,457). Chu substantially discloses all of applicant's claimed invention as discussed above except for the limitation that the rubber sponge material is thermal conductive. One of ordinary skill in the art would see that if the sponge material (36) is a thermal conductive material, it would enhance the heat dissipation of heat generating device (12) by forming an additional thermally conductive path between the head of the pin and the heat spreader (18). Attention is now directed to reference to Lamb for teaching of thermally conductive sponge material being both springy and thermally conductive using in a heat dissipation apparatus. Lamb discloses (figure 1 and column 2, lines 52-65) a heat dissipation apparatus having an interface material (120) disposed between a heat generating source (102) and a heat sink (130) wherein the interface material is made of a rubber sponge material which has a thermal conductivity of 0.5wat/(deg-K-meter) at 5 psi for the purpose of providing a thick compressible interface material and a good conduction heat path between the heat source and the heat sink. Since Chu and Lamb are both from the same field of endeavor, the purpose disclosed by Lamb would have been recognized in the pertinent art of Chu. It would have been obvious to one having ordinary skill in the art to make Chu's sponge material a thermal conductive sponge material as taught by Lamb for the purpose of providing a thick compressible interface material and a good conduction heat path between a heat source and a heat sink.

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Claims 11 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu (US 4,226,281) in view of Chu (US 5,394,299). Chu ('281) substantially discloses all of applicant's claimed invention except for the limitation that the pin shaft and the passageways being substantially rectangular. Chu (5,394,299) discloses (figure 2 and column 6, lines 14-21) a thermal transfer interface that has a thermal spreader having a plurality of passageways (14) and pistons (18) located within the passageways wherein the shape of the passageways (14) and piston are not limited to circular but rather may be rectangular for the purpose of increasing the heat transfer surface area between the pistons and the thermal spreader. It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ Chu's (5,394,299) teaching in Chu ('281) device for the purpose of increasing the heat transfer surface area between the piston and the thermal spreader.

Claims 5, 10 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu (4,226,281) in view of Antonetti et al. (US 4,153,107). Chu substantially discloses all of applicant's claimed invention as discussed above except for the limitation of a vent coupled to a passageway. Antonetti discloses (figure 1) a heat dissipation device that has a plurality of pins (26) movable within a passageway of a heat spreader (16), a helium gas is filled within the passageway and a vent (34) is coupled to the thermal spreader for the purpose of filling in or venting out the gas. Since Chu and Antonetti are both from the same field of endeavor and/or analogous art, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use Antonetti's teaching in Chu's device for the purpose of filling in or venting out the gas.

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***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Reisman et al. (US 4,449,580) discloses a vertical wall elevated pressure heat dissipation.

Kurihara et al. (US 4,649,990) discloses a heat conducting cooling module.

Kucharek (US 4,748,495) discloses a high density multi-chip intercooling.

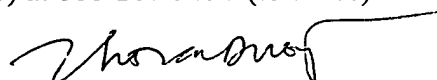
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tho v Duong whose telephone number is 571-272-4793. The examiner can normally be reached on M-F (first Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Bennet can be reached on 571-272-4791. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



TD  
January 24, 2005



Tho v Duong  
Examiner  
Art Unit 3743